

REMARKS

Applicants have amended claims 2, 6 and 7 and respectfully request reconsideration in view of the amendments and the following remarks.

Applicants amended claim 2 to correct a typographical error; amended claim 6 provides clear antecedent support; and claim 7 amends "nonferrous" to --non-ferrous-- for consistency with claim 1. Applicants respectfully submit that these amendments enter no new matter.

The action objected to claim 6 for use of the term "thermoplastic polymer" being inconsistent with the scope of claim 1. As suggested, Applicants have amended the term to polyvinyl alcohol to provide a clear antecedent basis.

The action rejects claims 1 to 10 over Tsuchiya et al. (U.S. Pat. Pub. No. 2002/0095872) in view of Kurata et al. (U.S. Pat. Pub. No. 2003/0219982). Tsuchiya et al. disclose a thickener in an amount of 0.001 to 0.05 wt% of a cationic surfactant, nonionic surfactant, anionic surfactant anionic, water-soluble polymer, nonionic water-soluble polymer or cationic water soluble particle. Tsuchiya et al. list about 20 cationic surfactants, 20 anionic surfactants, 10 total water-soluble polymers for a total of about 50 thickeners. The action selects polyvinylpyrrolidone from the list of nonionic water-soluble polymers. Specific Examples 1 to 7 from Tsuchiya et al., however, do not contain polyvinylpyrrolidone. Furthermore, Tsuchiya et al., fail to disclose the claimed benefits achieved with a combination of polyvinylpyrrolidone and polyvinyl alcohol. The action combines the polyvinylpyrrolidone of Tsuchiya et al. with the polyvinyl alcohol of Kurata et al.—Kurata et al. teach the use of polyvinyl alcohol in combination with a film forming agent, but fail to disclose the claimed benefits achieved with a combination of polyvinylpyrrolidone and polyvinyl alcohol. Kurata et al. list over 100 film forming agents and over 30 water-soluble polymers.

First, Applicants respectfully submit that there is no motivation to combine the references as suggested. Because polyvinyl alcohol is a water-soluble polymer, it has a significant impact on the viscosity of the slurry. There would be no motivation for one skilled in the art to substitute an inhibitor with an inhibitor mixture that impacts the slurry's viscosity, since this could destroy the thickener function of Tsuchiya et al. and would require at best a readjustment of the thickener concentration to compensate for the additional water-soluble polymer.

Second, the action applies an inappropriate "obvious to try" standard for the invention. In moving from the prior art to the claimed invention, one cannot base a determination of obviousness on what the skilled person might try or find obvious to try. Both the suggestion and the expectation of success must be found in prior art. The action first selects a thickener from a list of about 50 thickeners (surfactants and water-soluble polymers), then a film forming agent from a second reference with a list of greater than 100 film forming agents and finally a water-soluble polymer from a list of over 30 water-soluble polymers from the second reference. In summary, the rejection combines a 1 in 50 thickener choice, with a 1 in 100 film forming agent choice and a 1 in 30 water-soluble polymer choice for a total of 1 combination from a total of 150,000 combinations to form the rejection. From these remote odds, the action selects benzotriazole with polyvinyl alcohol to substitute for the benzotriazole of Tsuchiya et al. in combination with polyvinylpyrrolidone. Applicants respectfully submit that this represents an impermissible obvious to try standard and that there is no expectation of success for the proposed combination.

Third, the combined references teach away from the claimed invention. Table 1 of Kurata et al. teaches that polyvinyl alcohol increases copper removal rate (Example 4 with polyvinyl alcohol removes copper at 135 nm/min and Comparative Example 1 with no polyvinyl

alcohol removes copper at 80 nm/min.)—see earlier-submitted Declaration of Dr. Terrence Thomas. In addition Kurata et al. at paragraph 53, lines 23 to 29 state “In the polishing liquid for metal of the present invention, it is assumed that, as the protective film forming agent is used in combination with the water-soluble polymer, the protective film forming agent w[i]ll suppresses etching but fails to function as a metal surface protective film with respect to the friction caused by the polishing pad, thereby allowing a sufficiently high CMP rate.” Applicants have discovered that PVA in combination with polyvinylpyrrolidone decreases polishing rate of non-ferrous metals. Applicants’ amended claims reflect that increasing the weight ratio of the polyvinyl alcohol to the polyvinylpyrrolidone decreases the removal rate of the non-ferrous interconnect. Thus, since Kurata et al. disclose use of water-soluble polymer to maintain a high copper removal rate and the Example from Table 1 illustrates that PVA increases copper removal rate, Applicants respectfully submit that the combined references teach away from the claimed invention.

Thus, since the references fail to disclose the benefits achieved with a combination of polyvinylpyrrolidone and polyvinyl alcohol, there is no motivation to add an inhibitor that would function as a thickener to a thickener-containing slurry because of potential adverse viscosity consequences, the action relies on selecting a particular combination of ingredients from a list of 150,000 possibilities with no expectation of success and Kurata et al. teach away from using polyvinyl alcohol to reduce interconnect removal rate, claims 1 to 10, as amended, are not obvious in view of the combined references.

Claim 2—Tsuchiya et al. disclose an overlapping polyvinylpyrrolidone range, but not with the claimed combination of polyvinylpyrrolidone and polyvinyl alcohol for reducing non-ferrous metal removal rate.

Claim 3—Tsuchiya et al. disclose silica, but not with the claimed combination of polyvinylpyrrolidone and polyvinyl alcohol for reducing non-ferrous metal removal rate.

Claim 4—Kurata et al. disclose an overlapping polyvinyl alcohol range, but not with the claimed combination of polyvinylpyrrolidone and polyvinyl alcohol for reducing non-ferrous metal removal rate.

Claim 5—Tsuchiya et al. disclose an overlapping polyvinylpyrrolidone range, but not with the claimed combination of polyvinylpyrrolidone and polyvinyl alcohol for reducing non-ferrous metal removal rate.

Claim 6—the combined references do not teach or suggest the claimed ratio of polyvinylpyrrolidone to polyvinyl alcohol for reducing non-ferrous metal removal rate.

Claim 7—see arguments to amended claim 1 for reducing non-ferrous metal removal rate.

Claim 8—the combined references fail to disclose the benefits achieved with a combination of polyvinylpyrrolidone and polyvinyl alcohol and teach away from using polyvinyl alcohol to reduce interconnect removal rate for reducing non-ferrous metal removal rate.

Claim 9—Kurata et al. disclose polishing with a low dielectric rate, but not with the claimed combination of polyvinylpyrrolidone and polyvinyl alcohol for reducing non-ferrous metal removal rate.

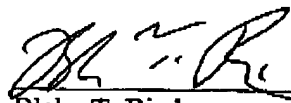
Claim 10—Tsuchiya et al. disclose polishing with a high removal rate for copper and they do disclose the claimed combination of polyvinylpyrrolidone and polyvinyl alcohol for reducing non-ferrous metal removal rate.

Applicants respectfully submit that the application is in condition for allowance and request reconsideration. If the Examiner does not agree that the amendment and remarks place the application in condition for allowance, Applicants respectfully request the entering of the

amendments for purposes of appeal. If a telephone call would expedite prosecution, please call me at (302) 283-2136.

Respectfully submitted,

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Date

  
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